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PAM 061.1 [NEW ZEALAND. ROSS DEPENDENCY RESEARCH COMMITTEE]

ROSS DEPENDENCY RESEARCH COMMITTEE

NEW ZEALAND ANTARCTIC PROGRAMME

1959-1960

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ROSS DEPENDENCY RESEARCH COMMITTEE

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Antarctic Division

New Zealand Department of Scientific & Industrial Research

December, 1959

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ORGANISATION

In general, the organisation of New Zealand activities in the Antarctic still conforms with the pattern outlined in "The New Zealand Antarctic Research Expeditions, Dec. 1958-Dec. 1959," published in February 1959.

There has been one significant change. Since May 1959, the implementation of the programme formulated by the Ross Dependency Research Committee and approved by the Minister in Charge of the Department of Scientific and Industrial Research is the responsibility of the Antarctic Division of the DSIR. The specific functions of the Division are:

(a) to be responsible for the execution and operation of Antarctic activities undertaken by the New Zealand Government;

(b) to supervise approved non-Government expeditions to Antarctica;

(c) to maintain an information centre on Antarctic scientific research and exploration.

Responsibility for the scientific details of the approved programme, the procurement of scientific equipment and the working up and publication of scientific data has been delegated as follows:

Meteorology	Director, New Zealand Meteorological Service
Survey and Maps	Surveyor-General, Lands & Survey Department
Geology and Glaciology	Director, Geological Survey, DSIR
Special Upper Atmosphere Investigations and Aurora	Director, Dominion Physical Laboratory, DSIR
Seismology, Geomagnetism, Ionosphere	Director, Geophysics Division, DSIR
Oceanography	Director, NZ Oceanographic Institute, DSIR
Biology	Director, Dominion Museum

Although responsibility for the working up and publication of scientific data rests with appropriate branches of DSIR and other institutions, the Division maintains an active interest in the progress of publication of Antarctic scientific investigations.

Mr. G.W.Markham is Superintendent of the Antarctic Division. He will continue to be Secretary of the Ross Dependency Research Committee.

The Division occupies premises at:-

124 Ghuznee Street,
WELLINGTON, C.2.

All correspondence should be addressed:-

The Superintendent,
Antarctic Division, D.S.I.R.,
P.O. Box 6022, Te Aro,
WELLINGTON, NEW ZEALAND.

The telegraphic address is:-

ANTARCTIC WELLINGTON.

LOGISTICS

Royal New Zealand Navy

As in previous years, the Royal New Zealand Navy will operate HMNZS "Endeavour" for the annual relief of Scott Base. "Endeavour" is planned to leave Wellington after Christmas 1959. After completing the relief of Scott Base about mid-January "Endeavour" will take Oceanographic and Seismic parties into the Ross Sea for survey work. She will return to Scott Base about February 20 for final loading and withdrawal to New Zealand about the end of February.

Royal New Zealand Air Force

The Antarctic Flight has been re-activated and is in training in New Zealand at present, in preparation for activities in the Ross Dependency over the next few years. A total of 8 personnel will comprise the Flight in the Dependency.

They are scheduled to arrive in McMurdo Sound on December 10 and hope to be airborne by December 15; from which time they will work in close support of the Geological and Survey Expedition. The Flight's area of operations will be from the Barne Inlet to the Beardmore Glacier. Its primary task is to fly men, stores and equipment to this area, but in addition the Flight will carry out extensive air reconnaissance and photography in preparation for the 1960/61 season.

U.S. Naval Support Force

As previously, considerable transport facilities will be provided by the U.S. Navy, on the ice-breakers and cargo ships of the U.S. Naval Support Force, Antarctica. Between them these ships will carry many tons of food and fuel, including 12 tons of meat for dog-food and over 11,000 gallons of aviation fuel. They will also transport the Auster and Beaver aircraft of the Antarctic Flight, RNZAF, and a new hangar. Some New Zealand personnel will also be carried on these ships. U.S. aircraft have flown in members of the various New Zealand field parties, their stores and equipment. In Antarctica the Support Force has provided air transport to some of the New Zealand field parties. Assistance will also be given in the installation of a radar field station.

New Zealand is indebted to the U.S. Navy for the considerable support afforded to her Antarctic programme.

SCOTT BASE

GENERAL

During the coming summer two new generators, each 45 kw output, will be installed at Scott Base. The intended position for the new generator house is indicated on the plan of the Base at the end of this booklet. This new building includes space for the generators themselves, for snow-melting facilities, for storage of one week's fuel supply, and for heated workshop space sufficient to take any vehicle up to Sno-cat size.

A further addition to the buildings at Scott Base will be an aircraft hangar, to be erected in the position indicated on the same map. The dimensions of the hangar are 57' x 63', which makes it of sufficient size to store both the Beaver and Auster aircraft with wings on, and even to accommodate larger aircraft if required.

The 1960 relief party comprises:

Lt Cdr J. Lennox-King, RNZN	Leader
Dr. C. A. Bailey	Doctor
Mr. F. A. McNeill	Senior Tech. Officer
Mr. C. A. Jenness	Technician
Mr. D. W. Holmes	Technician
Mr. D. W. Webster	Technician
Mr. J. G. Taylor	Technician
Mr. P. A. Yeates	Radio Officer
Mr. C.W.S. Kennedy	Maintenance Officer
Mr. R. J. Buckley	Maintenance Officer
Mr. R. G. Collins	Carpenter
Mr. J. A. Warren	Cook

Mr. Athol Roberts will be Information Officer and Postmaster at Scott Base from October 1959 to February 1960.

UPPER ATMOSPHERE PHYSICS

A. Ionosphere Vertical Soundings

The programme is designed to meet the minimum requirement for internationally circulated data of key parameters (f_oF_2, $L'F_2$, $M3000F_2$), the research interests of Geophysical Observatory, Christchurch, especially the study of sporadic layers and of ionospheric disturbance behaviour at different latitudes, and the Dominion Physical Laboratory in respect to auroral studies.

SCOTT BASE

The ionosonde is programmed to operate every 15 minutes with low and high gain runs at 59 and 01 mins. Where required for special investigations, such as during periods of strong auroral or magnetic activity, and during World Days, the recorder will be placed on minute recording.

Equipment

NZ panoramic ionosonde 1-22 Mc/s - 10 Kw.

Data Reduction

The ionograms are scaled every half hour to determine f_oF_2, f min and $(M3000)F_2$. Hourly values are telegraphed to Geophysical Observatory, Christchurch, which processes all NZ data for transmission to predicting and World Data centres. Other characteristics (particularly sporadic E) will be scaled for local research programmes.

B. D-region Investigations

The investigation of D-Layer reflections initiated at Scott Base in January by Dr. J. B. Gregory of the University of Canterbury will be continued for a further year.

Details of the equipment, etc. are:

(a) Aerial System

Four ½-wave dipoles in two rows of two, co-linear, at a height of approximately 1/8th wave length above the surface cover an area of 200 by 100 yards on slopes above Scott Base.

Operating frequency: 2.3 Mc/s.

(b) Transmitter

10 Kw minimum peak power.

Repetition rate 12.5, 25 or 50 p.p.s.

Pulse length: approximately 10 micro-seconds at ½-power points.

(c) Receiver

Band width: 50 Kc/s

Automatic stepped gain control is employed with 12 steps each of 6 decibels successive gain reduction.

Display: intensity modulated CRT presentation with linear sweep.

SCOTT BASE

(d) Camera

16 mm. continuous film movement at about 1 ft. per hour.

(e) Observation Schedule

Transmission of about 9 minutes per hour at a time to be specified. During each transmission a gain sweep is made.

(f) Overall Sensitivity

It is hoped that the apparatus will be able to detect partial reflections, of voltage coefficient not less than 10^{-5} below E region.

Data Reduction

Dr. J. B. Gregory, Physics Department, Canterbury University, is responsible for the working up and publication of the results of this investigation.

C. Auroral and Airglow Studies

Programme

The programme is an integral part of auroral studies along the meridian across Antarctica through the Pole Station, Scott Base, Hallett, Campbell Island, and Invercargill and Central Otago in New Zealand. It is being carried out in co-operation with the United States, which provides equipment, whilst New Zealand provides the scientific staff, equipment and base facilities. It has two objectives - firstly, regular photographic and spectrographic observations will provide basic data to meet international requirements. Secondly, research studies of the aurorae and southern auroral zone by all available means. The main problems are as follows:-

(a) The shape and behaviour of the auroral zone

(b) Systematic movements of aurorae

(c) Latitude characteristic of the airglow emissions

(d) Study of the occurrence and movement of auroral radar echoes and their correlation with other geophysical phenomena

(e) HF propagation through the auroral zone (see Section D. for details

By arrangement with the U.S. authorities an auroral tower and several pieces of equipment were last season transferred from Little America to Scott Base. These were set up, and have been operated by Scott Base staff during 1959. A radar has recently been made available from the U.S.A., and this will be set up during the 1959/60 summer at Arrival Heights.

Continuous visual watch will not be kept, and no demand will be made on staff to maintain observations. The operator of the auroral equipment will however be encouraged to make observations during the occurrence of flaming aurora, which is the only phenomenon which cannot be covered by the photographic programme.

Equipment

All-sky Camera (Black and White Film)

The instrument which operated during the I.G.Y. will continue to be programmed to make three or four exposures of different lengths every quarter hour (on the hour, half-hour and quarter-hour UT). The programming unit enables exposures to be made between 7½ seconds and several minutes in length, thus ensuring that there is adequate exposure whatever the brilliance of the auroral display. The all-sky cameras at Campbell Island, Invercargill and Central Otago are similarly programmed, and will expose at identical times during common hours of darkness.

All-sky Camera (Colour Film)

The second all-sky camera will continue to make continuous two-minute exposures during all clear dark hours.

Patrol Spectrograph I

The first patrol spectrograph transferred last season from Little America, will continue to be oriented along the Scott-Hallett great circle, and the Hallett patrol spectrograph will continue to be oriented likewise. Both spectrographs cover the visual range. This enables the relative intensities of the various emissions to be determined over a wide range of latitudes, and also triangulation of particular features which may be apparent.

During twilight hours the spectrographs will operate automatically, but during night hours exposures at Scott and Hallett will be synchronised.

SCOTT BASE

Patrol Spectrograph II

This instrument uses a similar programme, but covers the infra-red.

Other Instruments

The final optical instrument is a scanning spectrometer which will be operated for the research programme. Programming details have yet to be finalised.

Radar

A 41 Mc/s Radar, as used on the Alaskan Chain, has been made available by Stanford University, U.S.A. It will be set up on Arrival Heights, 1½ miles NW of NAF McMurdo. The exact site has yet to be chosen at a height of 4-500 ft. Building, power transmission line from NAF McMurdo and a new aerial system is being provided by New Zealand. It will be maintained by staff from Scott Base on periodic visits.

The programme for this equipment has been designed to supplement that of the 55 Mc/s Radar at Invercargill. To do this, a number of modifications to the original equipment have been made by the Dominion Physical Laboratory. The most important are a completely re-designed aerial system, a new camera, and a new programming system for the whole equipment. The radar will switch automatically every five minutes between two different bearings (320° and 260° true) which lie either side of the local declination. Observation of echo occurrence on each bearing will be made, and the recording of radial movements in each direction enables the absolute velocity and direction of movements to be determined.

Data Reduction of Auroral and Airglow Studies

Whenever possible films will be scanned and data extracted at Scott Base for subsequent research by New Zealand workers and for transmission overseas as required. As the auroral and airglow research programme and distribution of data is the responsibility of the Dominion Physical Laboratory, D.S.I.R., Lower Hutt, all data and films of these studies are sent in the first instance to the Dominion Physical Laboratory, Wellington.

SCOTT BASE

D. H.F. Propagation Through the Auroral Zone

This propagation project was commenced during I.G.Y. by the installation of a special pulse transmitter at Scott Base with automatic receivers placed at selected stations around the Antarctic continent and at Invercargill, N.Z. This phase of the investigation will be discontinued. During the coming season the transmitter aerial will be beamed on to the automatic receivers at Invercargill and Campbell Island to provide propagation data through the auroral zone along the N/S line on which New Zealand's auroral studies are concentrated. Vertical and horizontal angle of arrival measurements on the pulses will be attempted at Invercargill by Auckland University (Seagrove Radio Research Station). The transmitter will be maintained on its current schedule, namely transmission for two minutes every hour on each of the four frequencies 12, 16, 20 and 24 Mc/sec.

E. Whistlers

The observation of Whistlers initiated at Scott Base by Mr. L.H.Martin in April 1958 will be continued on the same basis as at present. Observations are also made at Wellington and Dunedin. The preliminary logging only is done at Scott Base, the results being assessed in New Zealand.

Data Reduction

The Dominion Physical Laboratory, D.S.I.R. is responsible for the reduction of data and publication of results.

F. Very Low Frequency Propagation

A receiver set up to monitor very low frequency transmissions from various stations in the Northern Hemisphere, but in particular GBR Rugby, has shown very interesting results and the work is being continued this year.

The Dominion Physical Laboratory, Wellington, is responsible for data reduction.

SCOTT BASE

GEOMAGNETISM

The emphasis in geomagnetic work is on the relationship of magnetic disturbance and the transient magnetic fluctuations with the geophysical disciplines. For these studies it is not essential for hourly values to be derived, hence these measurements were discontinued from the beginning of 1959. The programme will therefore consist of continuous recording by variographs and annual absolute observations.

Scott Base Magnetic Values (March 1, 1957)

H = 9770 gammas

Z = 69440 gammas

Instruments

La Cour wide range magnetograph
La Cour rapid run magnetograph
(both instruments have three-component photographic recording)
Single component fluxgate magnetometer (direct reading)
2 QHM for absolute measurement of D and H
1 BMZ for absolute measurement of Z

Data Reduction

K-indices and C figures will be sent monthly to the Permanent Service (de Bilt) and to the appropriate World Data Centre through the Magnetic Survey, D.S.I.R., Christchurch, where all records are deposited.

METEOROLOGY

Observations during 1960 will comprise:

(a) Standard meteorological observations at 00, 06, 12 and 18 GMT, with additional hourly observations of wind speed and direction, visibility, present and past weather and cloud type and amount.

(b) Recording of solar radiation using an Eppley solarimeter. Net flux of radiation using a Beckman and Whitley radiometer, associated albedo measurements, and the hourly observations will be discontinued at the end of February 1960.

SCOTT BASE

(c) The installation for measuring temperature profiles in the lowest 32 feet of the atmosphere will be retained for any investigations as required.

Data Reduction

The NZ Meteorological Office, Wellington, to whom all data is sent, is responsible for data reduction.

OCEANOGRAPHY

Apart from the ocean-going surveys (see separate section), a limited programme of shore-based work from Scott Base is planned. The tide gauge, which has been recording throughout the I.G.Y. and during 1959, will be continued in operation during 1960. Any further work will depend on the outcome of discussions currently in progress between New Zealand and United States authorities.

Data Reduction

The NZ Oceanographic Institute, D.S.I.R., will be responsible for the analysis of data from all these measurements.

SEISMOLOGY

Special attention is being given by Geophysics Division, D.S.I.R., to research into crustal structure based on the study of local earthquakes: also the study of microseisms. The definition of local seismicity requires many years' observations, particularly in those areas which are not unduly active.

Equipment

3 Benioff seismometers
3 short period (o.2 sec) galvanometers and 3 long period (25, 25, 10 sec.) galvanometers recording on 35 mm. film.

Data Reduction

Teleseismic arrivals are telegraphed to Seismological Observatory of Geophysics Division, D.S.I.R., Wellington, thence to US Coast and Geodetic Survey and BCIS Strasbourg. All data is deposited at the Seismological Observatory.

HALLETT STATION

Throughout the I.G.Y. and during 1959 Hallett Station has operated as a joint US/NZ station. The US established and maintain the station, provide the support staff and all scientific equipment. The scientific staff during 1960 will be provided by New Zealand and United States as follows:-

New Zealand

Mr. R. B. Thomson (Station Scientific Leader)	) Ionosphere
Mr. D. W. Farmer	) and Aurora
Mr. R. F. Brown	Geomagnetism and Seismology

United States

Mr. Charles F. Trainer	) Meteorology
Mr. D. L. Foster	)
Mr. Mark A. Gordon	Aurora (Riometer & Photometer)

This party will take over at Hallett during January 1960.

METEOROLOGY

The Programme is laid down by the US authorities.

GEOMAGNETISM

The operation of the Askania 3-component variograph will be continued, including sensitivity and scale tests, and daily rating of chronometer. Absolute values will be measured by a member of the staff of Magnetic Survey, D.S.I.R. Christchurch, towards the end of 1959 and again during the 1960/61 summer season.

Data Reduction

Processing of records is done at Magnetic Survey, Christchurch. Microfilm copies of magnetograms will be sent to US Coast and Geodetic Survey and to the appropriate World Data Centre.

IONOSPHERE

The station will operate as Class P Station as defined by the URSI/AGI Committee.

HALLETT STATION

The C_4 panoramic ionosonde will be programmed to give normal gain every 15 minutes with an additional low gain run 1 minute before each hour and a high gain run 1 minute after each hour. During World Days or during special periods, such as strong auroral displays the ionosonde will be operated on quick run.

Data Reduction

The ionograms will be scaled every half hour to determine f_oF_2, f-min and $M3000F_2$ and hourly values telegraphed to the Geophysical Observatory, Christchurch. Other characteristics (particularly sporadic E) will be scaled and telegraphed to the Geophysical Observatory as requested. These additional characteristics are required for research purposes. Data is deposited at the Geophysical Observatory.

SEISMOLOGY

The current programme will be continued.

Instruments

3 Lamont seismographs (period 15 sec., galvanometers 85 sec.)
1 Willmore seismograph

Data Reduction

Teleseismic arrivals are telegraphed to Seismological Observatory, D.S.I.R., Wellington, thence to US Coast and Geodetic Survey and BCIS, Strasbourg. Data is deposited at the Seismological Observatory.

AURORA

The auroral programme will continue as during 1959.

Visual Observations

Continuous visual watch will not be kept, and no demand will be made on staff to maintain observations. The operator of the auroral equipment will, however, be encouraged to make observations during the occurrence of flaming aurora, which is the most important phenomenon which cannot be covered by the photographic programme.

HALLETT STATION

All-sky Camera

This equipment will continue to be operated with black and white film and the US programmer used by all US Antarctic all-sky cameras. The films and log will be forwarded to the DPL Auroral Station, Invercargill, for processing and analysis upon return of the staff to New Zealand.

Patrol Spectograph

The operation of the patrol spectrograph has already been discussed under the same heading in the relevant section of the Scott Base programme. The film and log will be forwarded to the DPL Auroral Station, Invercargill, for processing on return of staff to New Zealand.

Riometer and Photometer

This equipment will be installed and operated by Mr. Gordon in accordance with the programme laid down by U.S. authorities.

NZ GEOLOGICAL AND SURVEY EXPEDITION 1959/60

Programme

Commencing this season it is the NZ plan to carry out each summer geological surveys and topographical mapping in an area of the Ross Dependency, and to reconnoitre an adjacent area for full surveys in the following season. This plan will be followed until the Ross Dependency has been fully mapped. The area selected for survey this season was the Victoria Land Coast fronting the Ross Ice Shelf, and its hinterland from Cape Selborne (80° 20' S.) to the Nimrod Glacier (82° 25' S.); to approximately 40 miles from the coastline and to the vicinity of Mount Albert Markham. The area to be reconnoitred this season was from the Nimrod to the Beardmore Glaciers, thence to the head of the Beardmore and westward over the Queen Alexandra Range region: full surveys of this sector being planned for the 1960/61 season. These zones of operations are shown on the map at the end of this booklet.

In addition to geological and mapping surveys it was planned to carry out glaciological measurements on the Ross Ice Shelf and a Gravity traverse into the hinterland of the region between the Barne Inlet and the Nimrod Glacier. A Worden Geodetic Gravimeter was to be used. The glaciological programme had two objectives.

First, work done during the I.G.Y. indicates that the ice shelf near Scott Base is probably not fed by the main part of the Ross Ice Shelf, but from local precipitation. It is planned to try to resolve this problem by establishing cairns at half-mile intervals along a line at right angles to the line forming the northern tip of White Island and Cape McKay. These cairns were to be surveyed in when parties entered the field in November 1959 and remeasured when they returned in February 1960 to determine movement, whilst accumulation poles would also be inserted to measure precipitation. Measurements would, if feasible, be repeated in subsequent seasons.

The second study is to try to throw some light on the movement of the Ross Ice Shelf. Therefore a site for similar measurements to the first study is planned further south as far as possible from land or other disturbing features.

NZ GEOLOGICAL AND SURVEY EXPEDITION 1959/60

Composition of Expedition

The operations were to be carried out by a Dog Party and a Sno-cat Party supported by the RNZAF Antarctic Flight.

Dog Team Party:

Mr. B. M. Gunn, Leader
Capt. P. J. Hunt, R.E. Surveyor
Mr. G. J. Matterson, Asst Surveyor/Field Assistant
Mr. K. C. Wise, Field Assistant
Mr. R. I. Walcott, Field Assistant

Sno-cat Party:

Mr. R. M. Robb, Leader/Sno-cat Driver
Mr. J. H. Lowery, Geologist
Mr. D. R. Goldschmidt, Surveyor
Lieut. T. Couzens, Engineer, Sno-cat Driver

Antarctic Flight:

Sq. Ldr. L. C. Jeffs
Flt. Lt. W. J. Cranfield
Flt. Lt. P. S. Rule
F/S. L. W. Tarr
Sgt. R. Fergusson
Cpl. A. B. Boag
L.A.C. G. M. Johnston
L.A.C. G. A. Hodson

Field Operations

The operational plan was for the Dog Team and Sno-cat Parties to leave Scott Base early in November in mutual support. After meeting at Cape Selborne the Sno-cats were to travel coastwise to Cape Wilson and the Dog Team Party to work inland and southward, completing the northern sector by mid to end December, when the RNZAF Antarctic Flight would be airborne to give support and carry out aerial reconnaissance and photography

NZ GEOLOGICAL AND SURVEY EXPEDITION 1959/60

in the southern sector. The Dog Team party left Scott Base on 2 November, followed by the Sno-cat party on 7 November. The two parties met and established camp on 17 November 8 miles south of Cape Selborne. On November 19, when proceeding on a reconnaissance one of the Sno-cats fell into a crevasse, resulting in the death of Lt. T. Couzens and injuries to Messrs. Gunn and Lowery. With the magnificent support of the U.S. Naval Support Force, and in particular VX6 Squadron, the injured men were withdrawn to New Zealand. The party was reformed into three dog teams with two men apiece, led by Mr. M. Robb, and it was decided to withdraw from the Barne Inlet to Shackleton Inlet (Nimrod Glacier) region for this season and concentrate on reconnaissance and topographical mapping in the more southern sector. This decision was made possible and was implemented on November 25 and 26 by the continued assistance of VX6 Squadron. A food and supply depot was established by the Squadron east of Mt. Tripp and the men and dog teams were flown into Cape Lyttelton. The party of 6 men are now carrying out topographical mapping in the coastal region between that point and the Beardmore Glacier. When the RNZAF Flight is operating in late December the reconnaissance of the southern sector will be extended.

VICTORIA UNIVERSITY OF WELLINGTON EXPEDITION 1959/60

The main purpose of this expedition is to complete the mapping and studies begun by the two previous University expeditions in the Dry Valley systems north of the Taylor Glacier in South Victoria Land. Something over half of the 2,500 square mile area has been mapped to date.

Composition and Operations

The expedition comprises:

Dr. R. W. Balham: leader and biologist

Mr. R. H. Wheeler: geologist

Mr. T. Allan: scientific assistant

Mr. I. Willis: scientific assistant

Mr. G. Gibson: scientific assistant

The expedition left New Zealand by US aircraft on 13 and 17 November, and were transported by US helicopter to the area of operations on 25 November. Reports indicate that the programme which follows is being out as planned.

Programme

Work this summer will proceed in the west and north of the Dry Valley area, from two base camps set up in the upper and lower parts of the Victoria Valley.

Geology:-

Extensions of the Beacon series will be made south-west to the Taylor to link in with areas immediately across the Taylor studied by McKelvey and Webb in 1957/58. Extensions of the same series to the north and to the west to link with regions mapped by the 1958/59 party and also by TAE geologists will also be made. The dolerites associated with the Beacon and with the basement rocks will be further examined and mapped and the basement metamorphics and granites studied further. General geological mapping of the whole of the remaining area will be carried out.

VICTORIA UNIVERSITY OF WELLINGTON EXPEDITION 1959/60

Paleomagnetism:-

A considerable amount of collecting of oriented specimens of Dolerite and Beacon sediments is anticipated. Last summer's party were unable to collect from the upper areas and have none from Beacon sediments.

Topographic Survey:-

Only a limited number of extra survey points are required to give good ground cover. The estimated number is 5, of which only one needs to be south of the Wright, the rest situated in the Victoria Valley area.

Glaciology:-

General glaciological observations will be made wherever appropriate; in particular studies of recession by moraines, cirque morphology, altitude of cirque floors and so on. It should be possible to measure movement of one selected glacier and also to obtain information regarding annual accumulation at high levels above the firn line.

Meteorology:-

Two recording stations will be set up, both in the Victoria Valley - one at either end. Standard observations will be made by instruments, self-recording where possible, and the radiation balance measured. Measurement of the upper winds will be made if practicable.

Biology:-

There will be two facets - a lymnological and biological survey of Lake Victoria and its vicinity, with special attention to the changes that take place over the summer period; and a general lichen survey, examining especially the distribution of lichen species.

BIOLOGICAL INVESTIGATIONS

During the 1959/60 summer a party of two, comprising:

Mr. E. C. Young, Leader

Mr. R. H. Taylor

is carrying out biological investigations at Cape Royds, Ross Island, McMurdo Sound. Mr. Taylor was taken to Cape Royds in late October, followed by Mr. Young in mid-November. The party will be withdrawn by sea from HMNZS "Endeavour" about mid-February. They are living in tents adjacent to Shackleton's Hut. Two studies are being attempted:-

A. A study of chick survival at an Adelie Penguin rookery, mainly by direct observation of banded and unbanded birds. This study will take in all possible limiting factors on the survival of chicks, and hence isolate the effect of predation. This study should have the wider significance of being a thorough investigation of a prey-predator relationship in which the total population of prey and also of the predators can be observed. It will comprise the following projects:-

(1) A study of the skua breeding habits and food habits.

(2) A survey of the breeding losses in the penguin rookery due to exposure, malnutrition, predation, etc.

(3) A study of these breeding losses as they differ from the edge of the rookery inwards and in areas of different exposure.

(4) A study of the diurnal rhythms of the two populations.

(5) An accurate mapping of the peninsula to facilitate the plotting of skua territories.

B. A study of territoriality, breeding behaviour, social organisation, social cohesion, feeding routine, food studies and seasonal fluctuations in numbers in an Adelie Rookery. As a contribution to the basic ecology of cold region vertebrates these studies will attempt the following:-

(1) Check on the number of birds establishing territory during the occupation period.

BIOLOGICAL INVESTIGATIONS

(2) Numbers incubating and numbers not incubating but maintaining territory.

(3) Extent of re-occupation at the end of the incubation period and numbers of additional territories established. Effect of the re-occupation of the non-breeders on the social organisation of the rookery.

(4) Study of the incubating and chick rearing routine and modifications in this as season progresses.

(5) A small study on the stomach contents of a sample of unoccupied birds.

(6) Use of a plankton hauling technique for estimating the potential food supply in the vicinity of the rookery.

(7) Study of the process of creche formation and organisation.

SOIL SURVEY

Two officers of the Soil Bureau, D.S.I.R., are this summer investigating the soil potentialities of the Ross Dependency.

The party comprises:

Mr. J. D. McCraw (leader): pedologist

Dr. G. G. Claridge: physical chemist

Programme

The primary purpose of the project is to search for evidences of physical weathering such as would indicate the beginnings of soil formation. The party will study the screes, moraines, sand dunes and other features of physical weathering; investigate lacustrine materials and other likely areas for the accumulation of fine material formed by physical and chemical weathering, and study frost phenomena such as stone polygons, etc., in an attempt to understand their method of formation.

Similar investigations will be carried out in other areas, e.g. the Dailey Islands, if opportunity arises. It is also hoped to set up a simple experiment on the Hut Point Peninsula which can be observed by Scott Base personnel over the next few years, to determine the rate of formation of stone polygons and other phenomena.

Movements

The two men were flown south by U.S. aircraft in late October. After a four-day tractor trip to Cape Royds and Cape Evans on November 5-8 for the purpose of collecting soil samples, they set out on November 19 with two companions to cross McMurdo Sound to the main Victoria Land coast. On the 22nd the party camped at the mouth of the Taylor Valley. From here the tractors returned to Scott Base.

By December 9 McCraw and Claridge had established camp 15 miles up the valley and had explored five miles further up. They expected to be ready to return to Scott Base by U.S. helicopter about December 18, after making their way to Marble Point, man-hauling their sledges some 15 to 20 miles.

NEW ZEALAND ALPINE CLUB
GEOLOGICAL AND SURVEY EXPEDITION 1959/60

The purpose of the expedition is to carry out geological reconnaissance surveys and topographical mapping of the unexplored region to the east of the Beardmore Glacier.

The party comprises:

Mr. R. W. Cawley, Leader
Dr. R. L. Oliver, Geologist
Mr. M. R. Bolt, Surveyor
Mr. N. C. Cooper, Assistant Surveyor
Mr. C. H. Tyndall-Biscoe, Field Assistant & Botanist
Mr. B. J. McGlynchy, Field and Survey Assistant
Mr. P.L.M. Bain, Field Assistant and Radio Operator
Mr. B. L. Smith, Field Assistant

Programme

The party plans to carry out geological and topographical surveys within a radius of 25 miles of the Advance Depot at approximately 84° 45' S., 177° E. The geological reconnaissance will be carried out in accordance with the requirements of the Director, New Zealand Geological Survey, and the topographical mapping in accordance with the requirements of the Surveyor-General, Lands and Survey Department. Mapping of sufficient accuracy to produce maps on a scale 1:250,000 is planned.

A collection of lichens and mosses will be made for the Dominion Museum and other scientific institutions: a schedule of collections requirements has been prepared with the approval of the Director, Dominion Museum.

The Expedition will depart from the Advance Depot on December 26 and proceed to NAAF Beardmore Depot in two parties by unnamed glaciers in the vicinity of 180° East, in time to arrive at NAAF Beardmore on January 13 for withdrawal by the RNZAF Antarctic Flight to Scott Base.

NEW ZEALAND ALPINE CLUB
GEOLOGICAL AND SURVEY EXPEDITION 1959/60

Movements

The expedition travelled to NAF McMurdo on U.S. aircraft between November 11 and 17, and members were then quartered at Scott Base during preparations for field work. The party was flown in two groups to the foot of the Beardmore Glacier on November 23 and 24. By December 2 a base camp had been set up 30 miles south of NAAF Beardmore at the mouth of a large, unnamed glacier 15 miles east of the Beardmore, near Mt. Kyffin.

By December 12 the expedition had completed the survey of a block of mountains around Mt. Kyffin and had climbed Mts. Scott, Harcourt, Kyffin, Henry and an unnamed peak. Mosses, lichens and invertebrates had been collected. A message gave the party's position as 83° 42' S., 173° 30' E.

OCEANOGRAPHIC SURVEYS

It is proposed to carry out oceanographic surveys from HMNZS "Endeavour" during a cruise in October 1959 and during a series of cruises in January and February 1960. The oceanographic work on these cruises will be carried out under the direction of the New Zealand Oceanographic Institute.

October Cruise

An oceanographic survey party travelled on HMNZS"Endeavour" during a cruise south of New Zealand, which was curtailed because of adverse weather.

Composition:

Dr. D. E. Hurley: Leader
Mr. R. P. Willis
Mr. D. G. McKnight
Mr. A. Langford
Mr. G. A. Harlen

Course and Programme

"Endeavour" left Wellington on October 1, Dunedin on October 6 and called at the Auckland Islands: then reached a point about 350 miles east of Campbell Island before steaming to a point about 100 miles south of the island in the direction of Macquarie Island. On the return voyage a call was made at Campbell Island.

The team occupied 27 stations, of which 24 were successful. Dredging and/or grab sampling was carried out, and at some stations collection of phytoplankton and zooplankton were made. Sediment samples were taken at all stations. Samples were successfully dredged from a 55 fathom pinnacle and the surrounding shoal half-way between New Zealand and Campbell Island. Echo soundings were made throughout most of the trip. A small inter-tidal collection was made at Campbell Island. A bird log was also kept. "Endeavour" returned to Dunedin on October 19.

Ross Sea Cruises

HMNZS "Endeavour" will spend about a month on seismic, magnetic and oceanographic investigations in the Ross Sea area during the 1959-60 summer.

OCEANOGRAPHIC SURVEYS

Composition:

Lieut. R. Adams: Leader
Mr. R. Garrick: geophysicist
Mr. R. Jenkins: technical officer
Mr. J. D. Bullivant: biologist
Mr. G. A. Harlen: technician
Mr. E. C. French: technician

Sea Seismic and Magnetic Programme

(a) Refraction survey of the thickness of the glacial deposits and sediments overlying the basement rock in the Ross Sea and across the continental shelf.

(b) Determination of crustal structure by refraction and reflection shooting on the oceanic side of the continental shelf.

(c) Reflection investigations of crustal structure in the Ross Sea. (Surface wave studies have shown that a continental type of crust occurs in this area).

The magnetic work will be carried out by towing the proton magnetometer behind the ship during cruises in the Ross Sea area. The chief objects are:-

(a) Elucidation of the geological structure.

(b) Investigating the accuracy of the total magnetic force charts.

Oceanographic Programme

The objectives are:-

1. Detailed bottom survey over the Pennell Bank and to the north-east down the slope of the Continental Shelf to investigate the influence of depth from 100 to 2,000 fathoms on the fauna.

2. Survey of the fauna and sediments and serial T/S observations from shallow water to 400 fathoms, originating near Beaufort Island or Victoria Land coast, generally in McMurdo Sound area.

OCEANOGRAPHIC SURVEYS

3. Experimental sampling in the McMurdo Sound area, comprising:-

   (a) Installation of two sediment traps in the vicinity of McMurdo Sound; the traps to be left down for one year.

   (b) Small scale survey of grab or dredge and camera stations in shallow water in the vicinity of Beaufort Island to determine if organic matter from penguin colony affects bottom fauna.

   (c) Comparative trials of bottom sampling equipment.

4. Sampling of ocean waters in three localities for $^{C}14$ dating, namely:-

   (a) Close to the Ross Ice Shelf about longitude 179° E.

   (b) On slope east of Pennell Bank.

   (c) Near 71° S. in the vicinity of 174° E. if practicable. At each station, surface, intermediate and bottom samples are required.

5. Underwater photography: U/W camera is to be used as extensively as possible at stations where depths permit.

6. Serial Temp/Sal. stations: These are required to supplement ^{14}C sampling and bottom fauna surveys.

7. Observations under way: Surface thermograph, echo sounder, B/T, surface water, phytoplankton observations and samples should be secured under way wherever possible. B/T observations each four hours are desirable. Bomb soundings are required where appropriate.

Operations plan

It is proposed to implement the scientific programme in three phases. The chart following shows the area of operations of each phase.

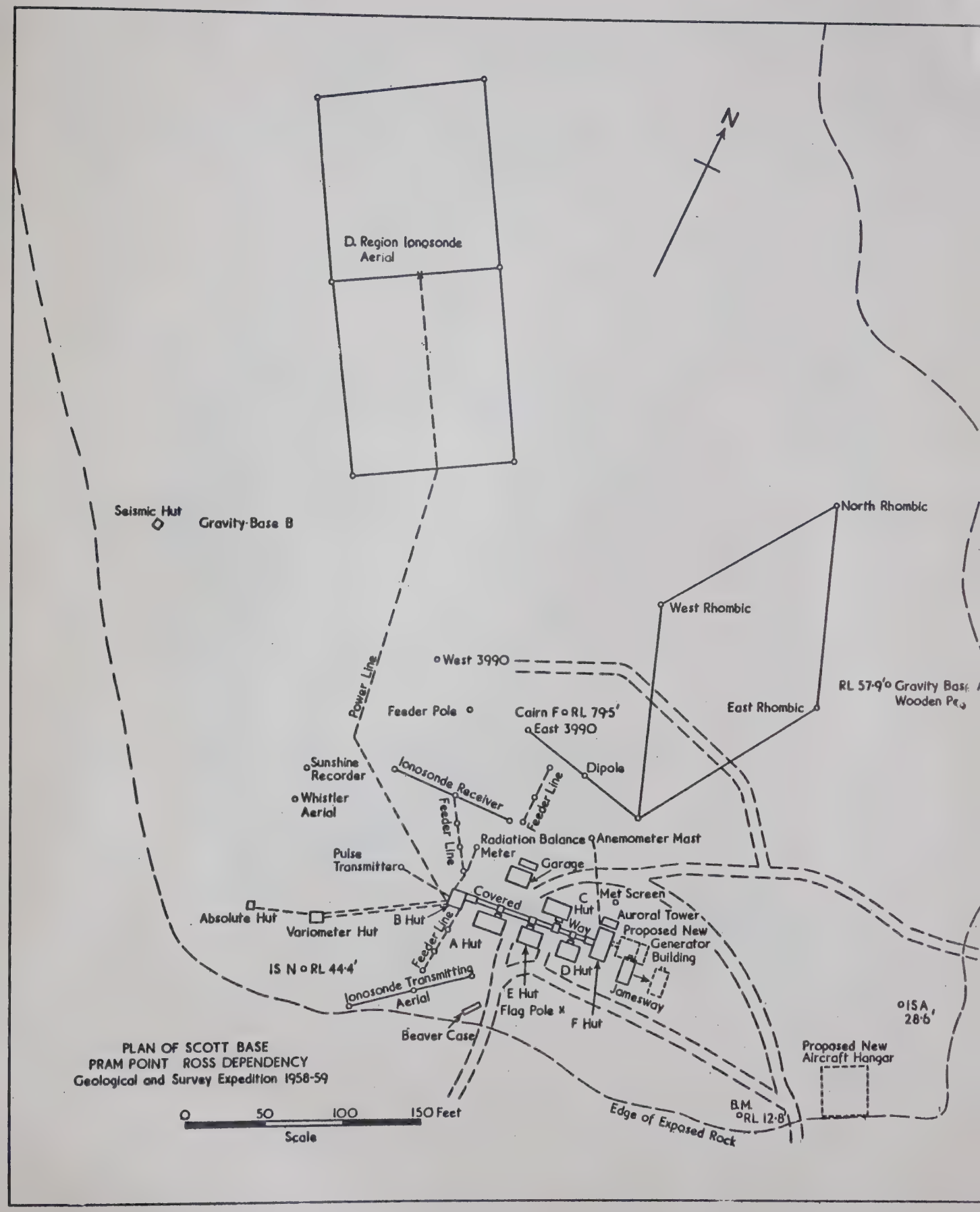
Phase 1 (12 days) will be almost wholly devoted to seismic profiles parallel to and northwards of the Ross Ice Shelf.

Phase 2 (12 days) will comprise seismic profiles and oceanographic surveys north-eastwards across the Pennell Bank and extending over the continental shelf. On a time basis, 8 days should be devoted to the former and 4 days to the latter.

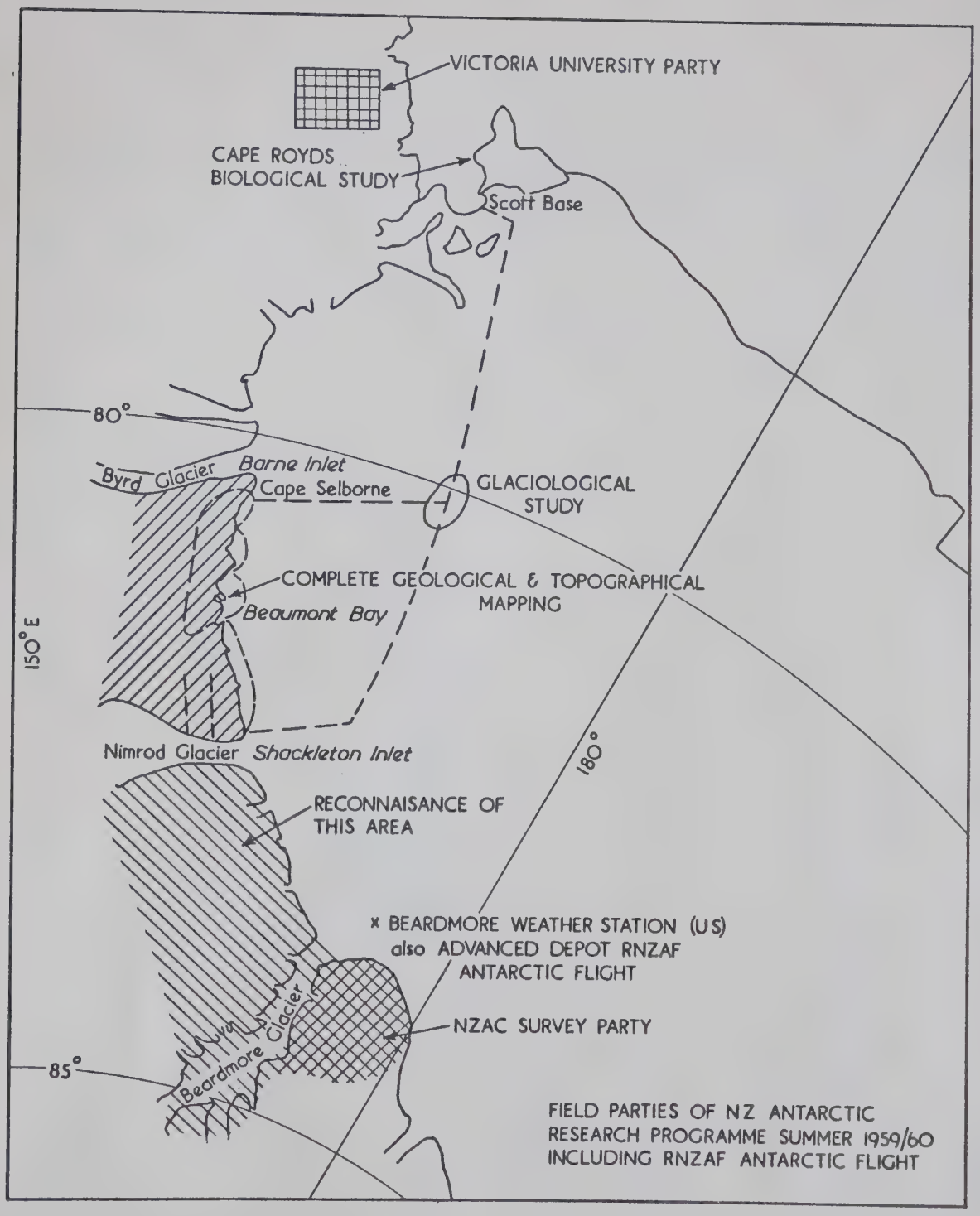
OCEANOGRAPHIC SURVEYS

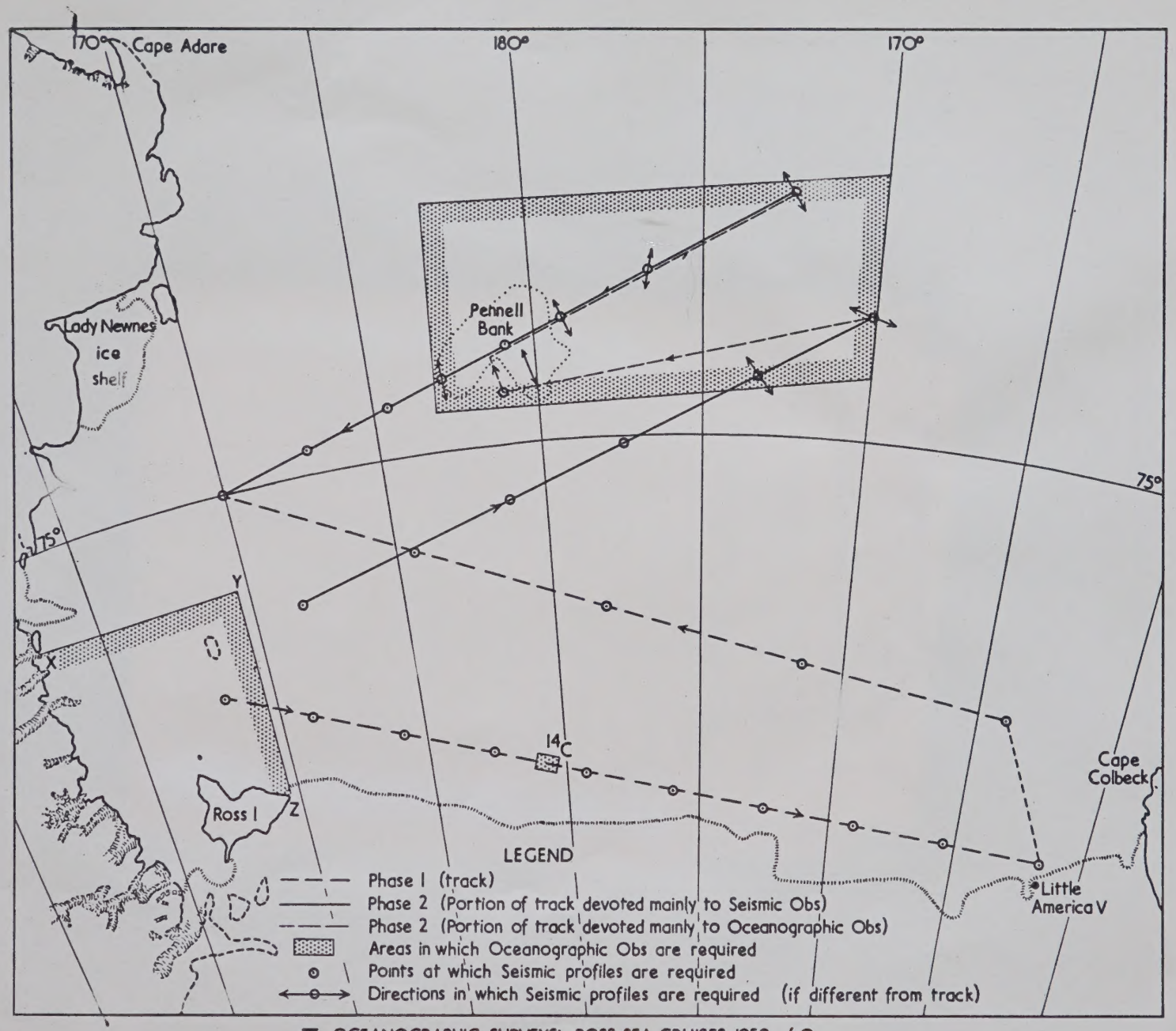
Phase 3 (8 days) will be almost wholly devoted to oceanographic work in the McMurdo Sound area.

The timing of each phase and the timing of the sections of the scientific programme within each phase will depend on operational conditions and the scientific requirements of each activity to obtain the data sought; this particularly applies to phases 1 and 2. Therefore, the courses shown for each profile or line of stations in these two phases are the preferred courses.



PLAN OF SCOTT BASE
PRAM POINT ROSS DEPENDENCY
Geological and Survey Expedition 1958-59


VICTORIA UNIVERSITY PARTY
CAPE ROYDS
BIOLOGICAL STUDY
Scott Base
80°
Byrd Glacier
Barne Inlet
Cape Selborne
GLACIOLOGICAL
STUDY
COMPLETE GEOLOGICAL & TOPOGRAPHICAL
MAPPING
Beaumont Bay
150°E
Nimrod Glacier
Shackleton Inlet
180°
RECONNAISANCE OF
THIS AREA
× BEARDMORE WEATHER STATION (US)
also ADVANCED DEPOT RNZAF
ANTARCTIC FLIGHT
NZAC SURVEY PARTY
Beardmore Glacier
85°
FIELD PARTIES OF NZ ANTARCTIC
RESEARCH PROGRAMME SUMMER 1959/60
INCLUDING RNZAF ANTARCTIC FLIGHT



III OCEANOGRAPHIC SURVEYS: ROSS SEA CRUISES 1959 - 60

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44706 Pam: (*7)
NZARP
1959-60
AUTHOR New Zealand. Ross Dependency
TITLE Research Committee. New Zealand
Antarctic Programme, 1959-1960.
PAM 061.1 [NEW ZEALAND. ROSS
DEPENDENCY RESEARCH COMM.]
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